killed per 1,000 employed gradually increased with only slight fluctuation; the number killed per 1,000,000 short tons also increased, but the rate fluctuated over a wider range.

During this twelve-year period through 1907, the increase in the death rate was accompanied by an enormous increase in the production of coal. In 1896 the output was 191,986,000 tons, and in 1907 it was 480,363,000 tons, an increase of over 150 per cent. In 1896 each man employed produced 2.64 tons coal per day, whereas in 1907 the daily production of each man was 3.06 tons, an increase of 16 per cent. Since 1907 there has been a marked decrease in the number of fatalities at the coal mines.

This general improvement has been brought about by a combination of causes, the principal one of which has been more efficient and effective mine inspection on the part of the state mining departments and the state mine inspectors throughout the country, supplemented by greater care on the part of both operators and the miners. The investigative and educational work of the Bureau of Mines has kept both the operator and the miner alive to the various dangers connected with coal mining, and has shown what precautions should be taken to avoid these dangers. As a result of these educational features, mining companies are organizing safety committees; providing emergency hospitals, training men in first aid and rescue work, so that in case of a disaster they are equipped to cope with any ordinary accident.

The fatality rates in a number of foreign countries covering a period of ten years, 1901 to 1910 inclusive, are as follows:

Great Britain, 1.36 per 1,000 men employed; Germany, 2.11; France, 1.69; Belgium, 1.02; Japan, 2.92; Austria, 1.04; India, 0.96; New South Wales, 1.74; Nova Scotia, 2.65, while the rate for the United States was 3.74. The low fatality rates in the foreign countries may be accounted for largely by reason of the fact that coal-mine inspection has been in operation much longer than in the United States. In Great Britain the coal mine accident statistics have been collected, published and studied since 1851; France, 1853; Austria, 1875; Germany, 1852; and Belgium, 1831.

A chronological list of the more disastrous coal-mine accidents in the United States shows that 275 accidents have occurred since 1839, in which five or more men were killed at one time, representing a total of 6,777 fatalities. Of these accidents there were 135 that killed from five to nine men each, a total of 859; eighty-two that killed from ten to twenty-four men each, a total of 1,237; twenty-five that killed from twenty-five to forty-nine men each, a total of 870; eighteen that killed from fifty to ninety-nine men each, a total of 1,221; eleven that killed from 100 to 199 men each, a total of 1,534; three that killed from 200 to 299 men each, a total of 695, and one that killed 361 men.

Of these larger disasters gas and coal-dust explosions caused 183 accidents and 5,111 deaths, or over three fourths of the total number of men killed. The next greatest number of deaths were from mine fires, which caused the loss of 1,082 lives, or over fifteen per cent. of the total number killed, by thirty-three separate accidents. It may thus be seen that accidents from gas and coal-dust explosions and mine fires account for more than ninety per cent. of the total number of men killed in these large accidents, although falls of roof, pillars and walls claim nearly fifty per cent. of the total fatalities.

THE RADIUM RESOURCES OF THE UNITED STATES

SECRETARY LANE proposes to withdraw all lands of the public domain suspected of containing radium, that their deposits may be secured for the public good and not become the subject of private speculation. Mr. Lane has outlined his plan in a letter to Chairman Foster of the House Mines Committee, urging immediate passage of a joint congressional resolution to empower President Wilson to make the withdrawals. Investigations of the Geological Survey have located public lands believed to contain the substance now so invaluable in medicine. By the terms of the proposed resolution the Secretary of the In-

terior would be authorized "to conduct explorations and researches with a view to determining the practicability of developing from such ores a supply of radium and to provide for the mining and treatment of radium-bearing ores in such manner as would best secure a supply of radium for the use of the government of the United States and the hospitals of this country."

Secretary Lane points out that there are only two grams of radium at present in the United States. It is valued at $120,000 a gram. All has been procured from Europe. "Three fourths of the radium produced in the world during the year 1912," says Secretary Lane, "came from American ores, yet we have, up to this time, taken no steps whatever to preserve for our own people this invaluable metal, and our physicians and hospitals are dependent upon European laboratories for such supply as they can procure, and are subject to whatever monopoly charge the European laboratories demand for their product."

In view of the use of radium in the treatment of cancer and the difficulty now experienced in obtaining a supply of it, Secretary Lane says, that as one person in every ten in this country more than fifty years of age suffers from cancer, "it is difficult to overestimate the necessity of securing immediately as large a supply as possible of this mysterious remedy." Continuing, the secretary says: "Radium is found in ores carrying uranium and vanadium, which are used extensively in the arts, and processes by which it is extracted are secret. A process has been invented by the chemists in our Bureau of Mines which promises, from the laboratory experiments thus far made, to be successful. Under the endowment of two Americans, a building is now being erected in Denver (which, with its equipment, will be opened for work in the coming February), in which an effort will be made to prove the commercial possibility of this American process. If successful, this process will be given to the world, and all of the radium secured over and above a small minimum will be the property of the United States, and will be put into the hands of the United States Public Health Service for public use. Under all these circumstances it seems to me that the only prudent course that the United States can follow is to withdraw such of its lands as are supposed to contain radium from public entry. This will guard against these lands being taken up by those who would not put them to their highest and most beneficial use. It would be inhuman to deprive other nations of access to our radium deposits if they alone were masters of the secret by which this mineral could be secured, and it is believed that there is a sufficient amount of carnotite and pitchblend already in private ownership in this country to permit of continued European experimentation and production. The people of the United States, however, should be entitled to protection against the exhaustion of this resource and its exclusive control by the scientists of other lands."

SCIENTIFIC NOTES AND NEWS

IT is proposed to place a suitable memorial of the late Alfred Russel Wallace in Westminster Abbey. It is also proposed to present a statue or bust to the British Museum of Natural History and a portrait to the Royal Society. Contributions to the Alfred Russel Wallace Memorial Fund may be sent to the Union of London and Smith Bank, Holborn Circus, London, E. C.

LORD RAYLEIGH will unveil a tablet to the memory of Lord Lister at King's College, London, on January 14. The ceremony will be followed by the inaugural lecture of the newly appointed professor of physics, Professor O. W. Richardson, F.R.S., recently of Princeton University, who will take as his subject "The Discharge of Electricity from Hot Bodies." Lord Rayleigh will also preside at this lecture.

SIR ARCHIBALD GEIKIE, the distinguished British geologist, has been appointed a member of the Order of Merit, filling the vacancy caused by the death of Alfred Russel Wallace.

OTHER New Year's honors in Great Britain include a viscountcy conferred on Mr. James